REMARKS

Favorable reconsideration of this application, in light of the following discussion and in view of the present amendment, is respectfully requested.

Claims 1-8 are pending.

I. Rejection under 35 U.S.C. § 102

In the Office Action, at page 2, numbered paragraph 3, claims 1, 2, and 3/1 were rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 6,421,458 to Michael et al. This rejection is respectfully traversed because Michael does not discuss or suggest:

> transformation means for performing two-dimensional and geometrical transformation on the created model pattern using a plurality of parameter sets to generate a transformed model pattern representing an image of the object with a three-dimensional orientation different from the reference orientation;
>
> pattern matching means for performing a pattern matching of the image data of the object captured by said image capturing means with the transformed model pattern;
>
> selecting means for repeatedly performing the generation of a transformed model pattern and the pattern matching of the image data of the object with the transformed model pattern to thereby select one of the transformed model patterns in conformity with the image data of the object, and obtain information on a position of the image of the object in the image data;
>
> means for obtaining information on a position of the image of the object in accordance with the selected one of the transformed model patterns in the image data;
>
> means for obtaining information on the three-dimensional orientation of the object based on one of the parameter sets used for generating the selected one of the transformed model patterns; and
>
> determining means for determining three-dimensional position and/or orientation of the object based on the information on the position of the image of the object in the image data and information on the three-dimensional orientation of the object,

as recited in independent claim 1.

Michael discusses capturing a series of training images of an object, where each training object 104 lies in nearly the same position and orientation relative to the imaging system 100. An alignment model image for the object is created by selecting from one or part of a series of training images of the objects 104. An affine pose 107 of each training image with respect to the

alignment model image is determined, and the training image is aligned with the alignment model image by affine transform of the training image using affine pose parameters.

While Michael does discuss capturing training images of an object, determining an alignment model image based on the captured training image data, and using parameters to determine the affine pose for each training image with respect to the alignment model image, Michael does not discuss or suggest transformation means that performs 2-D and geometrical transformation on the created model pattern to generate a transformed model pattern representing an image of the object **with a 3-D orientation *different* from the reference orientation**, for the pattern matching of the captured image data of the object with the transformed model patterns, as recited in independent claim 1, for example. In Michael, a training image is transformed to align the training image with the alignment model image. The training image is not transformed in order to represent an image of the object with an orientation that is different from the reference orientation (the alignment image), but is transformed in order to further align with the alignment model image.

Additionally, the Examiner alleges that the alignment model image corresponds with the reference model pattern. The transformation means of claim 1, for example, performs transformation on the created model pattern. However, in Michael, the training image and not the alignment model image is transformed in order to align with the alignment model image.

Michael discusses that an affine pose 307 and a filtered run-time image 309 are applied to a General Affine Transform 310 to generate a transformed image 311 which aligns substantially with the templates and threshold images 113, 115 computed during the statistical training. However, generating a transformed image 311 which aligns with the template and threshold images 113, 115 is not performing a pattern matching of the image data (training data) of the object with a transformed model pattern that is generated to represent an image of the object **different from the reference orientation**.

Also, Michael does not suggest repeatedly performing the generation of a transformed model pattern and the pattern matching of the image data of the object with the transformed model pattern to thereby select one of the transformed model patterns in conformity with the image data of the object.

Further, while statistics on the area, position and orientation of labeled regions of the error image may be used to classify an object as good or bad and affine parameters may be used in the General Affine Transform, Michael does not discuss or suggest that information **on a position** of the image of the object in accordance with a selected transformed model pattern is

obtained or that information **on the 3-D orientation** of the object **based on one of the parameter sets used for generating the selected transformed model pattern** is obtained. The transformed image 311, the template and threshold images 113, 115 and the alignment model image 114 are not used to obtain information on a position of the object or of a 3-D orientation of the object, particularly based on one of the parameter sets used in generating the alignment model image 114. Additionally, Michael does not suggest determining 3-D position and/or orientation of the object based on the information on the position of the image of the object and the 3-D orientation of the object.

Therefore, as Michael does not discuss or suggest "transformation means for performing two-dimensional and geometrical transformation on the created model pattern using a plurality of parameter sets to generate a transformed model pattern representing an image of the object with a three-dimensional orientation different from the reference orientation; pattern matching means for performing a pattern matching of the image data of the object captured by said image capturing means with the transformed model pattern; selecting means for repeatedly performing the generation of a transformed model pattern and the pattern matching of the image data of the object with the transformed model pattern to thereby select one of the transformed model patterns in conformity with the image data of the object, and obtain information on a position of the image of the object in the image data; means for obtaining information on a position of the image of the object in accordance with the selected one of the transformed model patterns in the image data; [and] means for obtaining information on the three-dimensional orientation of the object based on one of the parameter sets used for generating the selected one of the transformed model patterns," as recited in independent claim 1, claim 1 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Further, Michael does not discuss or suggest "transformation means for performing two-dimensional and geometrical transformation on the created reference model pattern using a plurality of parameter sets to generate a plurality of transformed model patterns each representing an image of the object with a three-dimensional orientation different from the reference position; storage means for storing the plurality of transformed model patterns and the parameter sets used in generating the respective transformed model patterns to be associated therewith; pattern matching means for performing pattern matching of the image data of the object captured by said image capturing means with the plurality of transformed model patterns to thereby select one of the transformed model patterns in conformity with the image data of the object, and obtain information on a position of the image of the object in the image data; means

for obtaining information on a position of the image of the object in accordance with the selected one of the transformed model patterns in the image data; [and] means for obtaining information on the three-dimensional orientation of the object based on one of the parameter sets used for generating the selected one of the transformed model patterns," as recited in independent claim 2. Therefore, claim 2 patentably distinguishes over the reference relied upon. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

Claim 3 depends directly from independent claims 1 and 2 and includes all the features of claims 1 and 2, plus additional features that are not discussed or suggested by the reference relied upon. For example, claim 3 recites that "said transformation means performs the two-dimensional and geometrical transformation of an affine transformation, and said image processing device further comprises additional measuring means for obtaining a sign of inclination of the object with respect to said image capturing means." Therefore, claim 3 patentably distinguishes over the reference relied upon for at least the reasons noted above. Accordingly, withdrawal of the § 102(b) rejection is respectfully requested.

II. Rejections under 35 U.S.C. § 103

In the Office Action, at pages 8-11, numbered paragraphs 5-8, claims 4-8 were rejected under 35 U.S.C. §103(a) as being unpatentable over various combinations of Michael, European Patent Publication No. 1043689 to Watanabe et al., U.S. Publication No. 2003/0161537 to Maeda et al., U.S. Publication No. 2003/0161504 to Inoue and U.S. Patent No. 6,806,903 to Okisu et al. These rejections are respectfully traversed.

Watanabe, Maeda, Inoue and Okisu fail to make up for the deficiencies in Michael with respect to independent claims 1 and 2. Therefore, claims 1 and 2 patentably distinguish over the references relied upon for at least the reasons noted above. Claims 4-8 depend either directly or indirectly from independent claims 1 and 2 and include all the features of claims 1 and 2, plus additional features that are not discussed or suggested by the references relied upon. For example, claim 4 recites that "said additional measuring means performs dividing of a model pattern into at least two partial model patterns which are subject to the affine transformation to generate transformed partial model patterns, and pattern matching of the image data of the object with the transformed partial model patterns to determine most conformable sizes, and determines the sign of the inclination based on comparison of the sizes of the conformable partial model patterns with each other." Therefore, claims 4-8 patentably distinguish over the references relied upon for at least the reasons noted above. Accordingly, withdrawal of the §103(a) rejection is respectfully requested.

Conclusion

In accordance with the foregoing, claims 1-8 are pending and under consideration.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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Date: August 28, 2008

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